

In summary, Jack Cohen and Graham Medley draw heavily from their own experience, which gives their opinions and examples more credence, although if you do not happen to work on cabbage growth or rabbit sperm it can be a challenge to apply these ideas to your own research. However, this book really is an invitation to start thinking; it raises questions without providing all

the answers. It challenges the working-all-hours culture and illustrates the need to think and plan ahead to be truly successful. I would strongly recommend that all PhD students stop working, start thinking, and do take the time to read this book. If you don't think that you can find the time then you are precisely the target audience.

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## Retinal Development

Edited by Evelyne Sernagor, Stephen Eglén, Bill Harris and Rachel Wong

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Historically, the eye has been prominent in study numerous biological processes. Until the end of the 19<sup>th</sup> century, although it was clear that the eye receives some kind of an inverted image projected from the outside world, scientists were uncertain about the precise structure of the retina and its underlying functional mechanisms. This all changed with the first thorough anatomical description of the retinal cell types and connectivity by Cajal in 1893. His observations were, and remain, the basis for the studies we know today. The organization of the retina with its seven cell types and specific microcircuitry might appear relatively simple, but on closer examination its true complexity emerges. This, together with the facts that the eye is an extension of the brain proper and is easily accessible for manipulations and imaging, makes the retina a very appealing structure for studies on neurodevelopment.

This book, edited by Evelyne Sernagor, Stephen Eglén, Bill Harris and Rachel Wong, gives an excellent overview on the different steps of

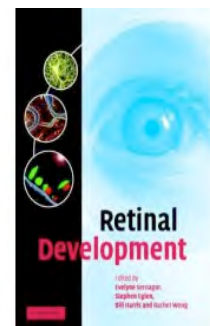
retinal development and the current knowledge in the field, starting from the early specification of the eye-field in the embryo up to the light-evoked responses in the retina after birth. It therefore brings out beautifully the broad spectrum of research and its importance for general developmental neurobiology.

In the first few chapters, the book covers the formation of the eyes, the timing and molecular basis for the generation of the different cell types and how these cells migrate to their final destination in the appropriate layers. Already here two important features of the book emerge: First, it is not restricted to only one species or system, but rather tries to incorporate information from multiple sources. This allows making cross-species comparisons and creating a general view of the developmental mechanisms. Secondly, the parallels between developmental processes in the retina and elsewhere in the nervous system, for example during cortical layer formation or the generation of specific cell types in the spinal cord, become clearly evident.

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The book then continues to describe the primate fovea and the formation of the optic nerve, before going into more details about retinal glial cells and the description of retinal mosaics. During development it is estimated that more than 50% of the retinal ganglion cells undergo programmed cell death. It is therefore not surprising that one chapter is dedicated to describe this issue entirely, including the underlying mechanisms. The second part of the chapter is a critical view on possible functional roles for programmed cell death in the retina and discusses carefully the available literature.

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Next the establishment of the microcircuitry in the retina is examined with a chapter about dendritic growth, followed by two chapters describing the processes of synaptogenesis and neural activity. Here again the book brings out the complexity of the retina, describing the formation of synapses between the different cell types and the activity-based mechanisms at different levels during development. Starting prior to birth, relatively slow spontaneous retinal waves are generated, which appear to play important roles in the wiring of the visual system intraretinally as well as for the connections of the eye to its central targets. After birth, the retina starts to respond to light, first only through melanopsin expressing retinal ganglion cells alone that project to the SCN and only later through the classical photoreceptor dependent mechanisms that are needed to see the outside world.

The book closes with three chapters describing “New Perspectives” in the field, where regeneration and retinal stem cells, the use of genomics, and finally models of retinal development and diseases are discussed. As in the rest of the book, the authors achieve an excellent summary of the present knowledge in these fields. For example

the list of all retinal genomics screens carried out so far, including the different techniques and key results should be a valuable resource for others in the field. Evenly, the list and description of the different zebrafish retina mutants is helpful. Their link to human retinal diseases ultimately closes the circle and brings us back to what is written in the beginning of the book: its dedication to the prevention of blindness.

This book follows exactly its title: it gives an overview on retinal development and is therefore different from general textbooks about the visual system. Topics like for example the projection of retinal axons to central targets or how visual information is processed in the brain are deliberately left out. Thus, the editors have created a well-written and unique resource with a clear focus. Overall, Retinal Development is a comprehensive book that features a collection of excellent reviews. But rather than giving only an up-to-date view on the status quo in retinal research, it goes a step further and brings out some of the important open questions still to be answered, to understand the development of the retina as well as the nervous system in general. The book is therefore not only appropriate for specialists in the field of retinal research, but certainly for a wider scientific audience.

